

Active Reading

Section: Looking at Cells

Read the passage below. Then answer the questions that follow.

Measurements taken by scientists are expressed in metric units. The official name of the metric system is the International System of Measurements, abbreviated as SI. SI is a decimal system, so all relationships between SI units are based on powers of 10. For example, scientists measure the sizes of objects viewed under a microscope using the SI base unit for length, which is the meter. One meter (1 m), which is about 3.28 ft (a little more than a yard), equals 100 centimeters (cm), or 1,000 millimeters (mm). A meter also equals 0.001 kilometer (km). Most units have a prefix that indicates the relationship of that unit to the base unit. For example, the symbol μ stands for the metric prefix *micro*. A micrometer (μm) is a unit of linear measurement equal to one-millionth of a meter, or one-thousandth of a millimeter.

SKILL: READING EFFECTIVELY

Read each question, and write your answer in the space provided.

1. How are the metric system and SI related?

2. Why are all relationships between SI units based on powers of 10?

3. What unit is used to measure the length of objects viewed under a microscope?

4. Why do most SI units contain a prefix?

Active Reading *continued***SKILL: ORGANIZING INFORMATION**

Use information contained in the passage to complete the table.

| Unit | Prefix | Metric equivalent |
|------------------------------|--------|-------------------|
| Kilometer (km) | 5. | 6. |
| Centimeter (cm) | 7. | 8. |
| Millimeter (mm) | 9. | 10. |
| Micrometer (μm) | 11. | 12. |

In the space provided, write the letter of the term or phrase that best completes the statement.

- _____ 13. A person who is 2 m tall is
- a. exactly 6 ft tall.
 - b. less than 5 ft tall.
 - c. a little more than 6 ft tall.
 - d. a little more than 3 ft tall.

Answer Key

Directed Reading

SECTION: LOOKING AT CELLS

1. c
2. a
3. e
4. b
5. d
6. Magnification is the ability to make an image larger. Resolution is a measure of the clarity of an image.
7. A light microscope uses light to produce a magnified image of an object. An electron microscope uses a beam of electrons to produce a magnified image of an object.
8. A magnifying glass has one lens, but a compound microscope has at least two lenses.
9. The electron beam of a transmission electron microscope passes through the specimen. The electron beam of a scanning electron microscope bounces off the specimen.

SECTION: CELL FEATURES

1. The cell theory states that all living things are made of one or more cells, that cells are the basic units of structure and function in organisms, and that all cells arise from existing cells.
2. Small cells can exchange substances more readily than large cells can because small objects have a higher surface area-to-volume ratio.
3. Prokaryotes are single-celled organisms that lack nuclei and other internal compartments.
4. Flagella are long, threadlike structures that protrude from the surfaces of cells and enable movement. Cell walls are structures that surround cell membranes and provide structure and support.
5. They provide structure and support.
6. d
7. b
8. c
9. a
10. head, tails
11. lipid bilayer
12. The middle part of a membrane protein is nonpolar, and it is therefore attracted to the nonpolar phospholipid tails in the interior of the lipid bilayer. The outer parts of a membrane protein are polar, and they are therefore attracted to the polar water molecules on either side of the lipid bilayer.
13. Cell membranes enclose cells, separating their contents from their surroundings, and regulate the entry and exit of substances.
14. d
15. b
16. a
17. c

SECTION: CELL ORGANELLES

1. RNA and ribosomal proteins
2. DNA
3. c
4. a
5. b
6. d
7. ATP is an organic molecule that acts as the main energy currency of cells.
8. Mitochondria harvest energy from organic compounds and transfer the energy to ATP.
9. Both
10. Both
11. Both
12. Plants
13. Both
14. Plants

Active Reading

SECTION: LOOKING AT CELLS

1. SI is the abbreviation for the International System of Measurements, which is the official name of the metric system.
2. SI is a decimal system.
3. the SI unit of length, or the meter, to express the length of objects
4. to indicate the relationship of that unit to a base unit

5. Kilo-
6. 1,000 m
7. Centi-
8. 0.01 m
9. Milli-
10. 0.001
11. Micro-
12. 0.000001
13. c

SECTION: CELL FEATURES

1. The middle part of the membrane protein is attracted to the interior of the lipid bilayer but is repelled by the water on either side of the lipid bilayer.
2. The inner and outer parts of the membrane protein are mostly polar.
3. the dual attraction of the inner and outer parts of the protein to water
4. Cause: Phospholipids are fluid and in motion. Effect: Cell-membrane proteins move within the lipid bilayer.
5. that there are different types of proteins in the cell membrane
6. marker proteins
7. help other cells recognize their cell type
8. receptor proteins
9. recognize and bind to specific substances outside the cell
10. transport proteins
11. aid the movement of substances into and out of the cell
12. d

SECTION: CELL ORGANELLES

1. The vesicles move from the ER through the cytosol to the Golgi apparatus.
2. a set of flattened, membrane-bound sacs that serve as the packaging and distribution center of the cell
3. from buds on the surface of the Golgi apparatus
4. small, spherical organelles that contain a cell's digestive enzymes
5. b

Vocabulary Review

1. LIGHT MICROSCOPE
2. ELECTRON MICROSCOPE
3. MAGNIFICATION
4. RESOLUTION
5. SCANNING TUNNELING
MICROSCOPE
6. CELL THEORY
7. CELL MEMBRANE
8. RIBOSOME
9. PROKARYOTE
10. FLAGELLA
11. ORGANELLE
12. CILIA
13. EUKARYOTE
14. NUCLEUS
15. CYTOPLASM
16. CYTOSKELETON
17. PHOSPHOLIPID
18. LIPID BILAYER
19. endoplasmic reticulum
20. vesicle
21. Golgi apparatus
22. lysosomes
23. mitochondria
24. chloroplasts
25. central vacuole
26. cell wall

Science Skills

INTERPRETING DIAGRAM

1. Cell 1—plant cell
 - A. cell wall
 - B. central vacuole
 - C. chloroplast
2. Cell 2—bacterium
 - D. cell membrane
 - E. cell wall
 - F. DNA
3. Cell 3—animal cell
 - G. smooth ER
 - H. mitochondrion
 - I. rough ER
4. The bacterium is a prokaryotic cell. The plant cell and the animal cell are eukaryotic cells.
5. One difference is that the bacterium, a prokaryote, does not have a nucleus or other organelles that carry out specific functions. The plant cell and the animal cell, which are both eukaryotic cells, do contain organelles. Such